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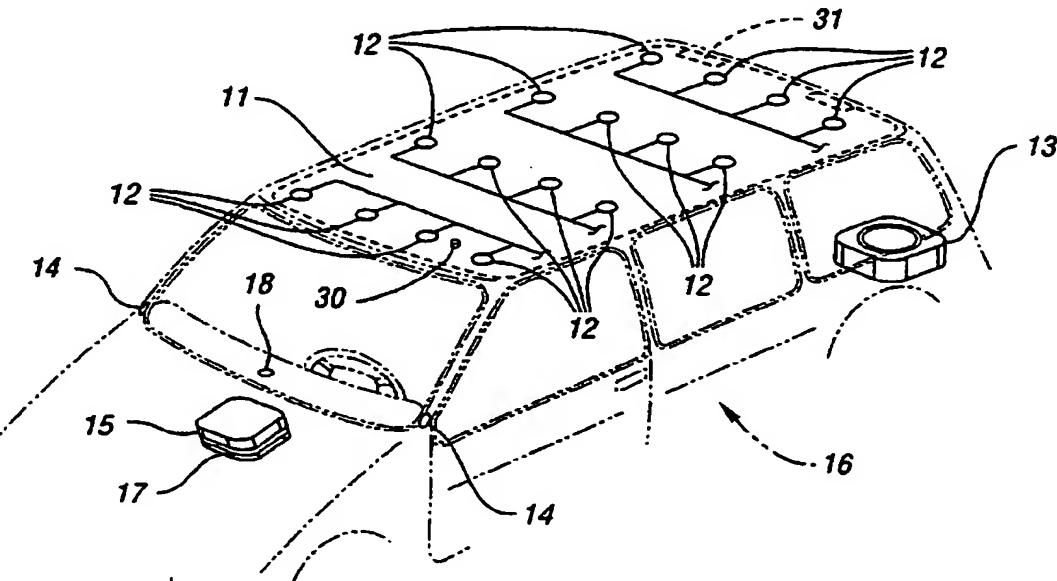
(84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

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(54) Title: VEHICULAR AUDIO SYSTEM INCLUDING A HEADLINER AS VIBRATING DIAPHRAGM AND WITH A COMPUTER SYSTEM



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(57) Abstract: A vehicle overhead audio system an electromagnetic transducer assembly for use therein and a computer system programmed with a graphic software control for changing the audio system's signal level and delay are provided where a headliner of the vehicle is a loudspeaker of the system thereby replacing many other loudspeakers and being invisible to the occupants. The headliner is driven in multiple zones that effect proper imaging for all occupants. Supplemental high frequency and subwoofer speakers and signal processing circuitry are included in one aspect of the invention.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/00/23476

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04R5/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04R H03G B60R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 754 664 A (CLARK DAVID L ET AL) 19 May 1998 (1998-05-19) cited in the application	1-6, 9-16, 18-33, 37,38
A	column 2, line 19-65 column 3, line 49 -column 5, line 62 column 6, line 60 -column 9, line 56 ---	7,8,17, 34-36, 39-60 -/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 June 2001	02/07/2001

Name and mailing address of the ISA
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Zanti, P

INTERNATIONAL SEARCH REPORT

National Application No

US 00/23476

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 98 13942 A (NOISE CANCELLATION TECH) 2 April 1998 (1998-04-02) cited in the application	1-6, 9-16, 18-33, 37,38
A	page 1, line 2,3 page 2, line 15-27 page 3, line 23 -page 14, line 6 page 15, line 7 -page 16, line 12 ---	34-36, 40-60
Y	WO 98 42536 A (NEW TRANSDUCERS LTD ;AZIMA HENRY (GB); COLLOMS MARTIN (GB); ELLIS) 1 October 1998 (1998-10-01)	1-6, 9-11, 13-16, 18,19, 28,31,32
A	page 2, line 20 -page 9, line 20 page 10, line 12 -page 12, line 21 ---	7,8,12, 17, 20-27, 29,30, 33-60
X	US 5 617 480 A (BALLARD BRADLEY A ET AL) 1 April 1997 (1997-04-01) column 2, line 31 -column 3, line 19 column 4, line 6-9 column 5, line 13-22	61
A	column 5, line 51 -column 6, line 21 column 8, line 50 -column 9, line 29 ---	1,40,41, 45

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/US 00/23476

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 5754664	A	19-05-1998		DE 4431873 A GB 2281836 A, B JP 7304397 A		16-03-1995 15-03-1995 21-11-1995
WO 9813942	A	02-04-1998		AU 4594397 A EP 0976200 A JP 2001501792 T		17-04-1998 02-02-2000 06-02-2001
WO 9842536	A	01-10-1998		AU 728105 B AU 6511298 A BG 103731 A BR 9807882 A CN 1251069 T EP 0968099 A HU 0002185 A NO 994590 A PL 335836 A SK 128499 A TR 9902384 T ZA 9802332 A		04-01-2001 20-10-1998 31-05-2000 22-02-2000 19-04-2000 05-01-2000 28-10-2000 21-09-1999 22-05-2000 16-05-2000 21-06-2000 23-09-1998
US 5617480	A	01-04-1997		CA 2112171 A		26-08-1994

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference LDOS0230PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 00/ 23476	International filing date (day/month/year) 25/08/2000	(Earliest) Priority Date (day/month/year) 25/08/1999
Applicant LEAR CORPORATION et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. **Certain claims were found unsearchable** (See Box I).

3. **Unity of invention is lacking** (see Box II).

4. With regard to the title,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

VEHICULAR AUDIO SYSTEM INCLUDING A HEADLINER AS VIBRATING DIAPHRAGM AND WITH A COMPUTER SYSTEM

5. With regard to the abstract,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

1

None of the figures.

INT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION
(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 14 August 2001 (14.08.01)	International application No. PCT/US00/23476	Applicant's or agent's file reference LDOS0230PCT
International filing date (day/month/year) 25 August 2000 (25.08.00)	Priority date (day/month/year) 25 August 1999 (25.08.99)	
Applicant SLEBODA, Paweł, W. et al		

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

13 March 2001 (13.03.01)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Antonia Muller Telephone No.: (41-22) 338.83.38
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